7.0 ATTACHMENT: POST PUBLIC NOTICE ADDENDUM: September 2013

The draft NPDES permit for the BP Products North America, Whiting Refinery was made available for public comment from March 28, 2013 through April 29, 2013 as part of Public Notice No. 2012-3K-RD/ATEL. During this comment period, IDEM received three written comment letters.

The first comment letter dated April 28, 2013, was received from and endorsed by the following environmental organizations: National Resources Defense Council, Alliance for the Great Lakes, Save the Dunes, Hoosier Environmental Council, Isaak Walton League - Porter County Chapter and Sierra Club – Hoosier Chapter. These are identified as comments 1 through 37.

The second comment letter dated April 29, 2013, was received from BP Products North America, Whiting Refinery signed by Ms. Linda Wilson, Environmental Superintendent of the Whiting Business Unit. These are identified as comments 39 through 64.

The third comment letter was from Mr. Don Wilson dated June 14, 2013. This comment is comment 65.

The comments submitted by the environmental organizations, Mr. Wilson and BP Products North America – Whiting Refinery, and this Office's corresponding responses are summarized below. Any changes to the permit and/or fact sheet are so noted below.

Comment 1:

I. Stormwater

The Draft Permit requires, "within 12 months from the effective date of this permit, the permitee is required to revise and update the current Storm Water Pollution Prevention Plan (SWP3)." However, the Fact Sheet expressly states that [t]he requirement to prepare a SWP3 is not an effluent limitation." Fact Sheet at 32. Hence, there is no provision in the Draft Permit requiring either review of the SWP3 by IDEM, or allowing for public comment on it. The Permit does not even require that the SWP3 be submitted to IDEM, so that interested members of the public can review it.

For the reasons set forth below, this understanding of the legal nature of a SWP3, and concomitant failure to provide for review and comment, are directly at odds the CWA requirements defined in federal judicial determinations governing pollution control plans of this nature. The Clean Water Act ("CWA" or "Act") requires that the SWP3 be treated as part of the Permit in every respect. That said, at the very least, IDEM could have required that the SWP3 be provided to it, rather than simply held onsite by BP where the public has no ability to review it – which would be legally inadequate but at least a positive step in the right direction.

A. IDEM Should at Minimum Require Submittal of the SWP3

We are mindful of the concern expressed by IDEM that SWP3s must be flexible, and should not be inhibited by overly rigid public comment or agency review procedures. However, this concern is not grounds to simply ignore altogether the legal requirements applicable to SWP3s. IDEM could, at minimum and as a gesture of good faith, take steps to address the underlying concerns that prompted the judicial rulings concerning SWP3s described in the previous section, while still maintaining flexibility for amendment of SWP3s as necessary. While such action would not bring the Permit into compliance with the CWA, it would at least be a step in the right direction.

If IDEM took even the modest step of requiring that BP provide it with a current copy of the SWP3, the public would at least be able to submit a Public Records Act request for the document and review it. Commenters understand that SWP3s may potentially be updated with some frequency (although we do not know that to be the case with respect to BP's SWP3, as none of us has seen it). Although it would be ideal if each such iteration were submitted to IDEM and available to the public, even periodic reporting of an updated version of the SWP3 would at least provide the public with a sense of what specific steps are being taken onsite, and how those steps may have evolved over time.

We note, in this regard, that U.S. Steel readily agreed in 2009, despite IDEM's resistance, to make its SWP3 public. In an agreement executed shortly after the final permit was issued,

U.S. Steel agreed not only to provide the citizens with a copy of its SWP3, but agreed to promptly provide them with updates to the SWP3 as well. Clearly, the company did not consider this limited requirement to be an undue burden, or a constraint on its flexibility in amending the SWP3. IDEM should mandate the same here, as the public's ability to view the SWP3 – a minimal portion of a much broader set of legal requirements concerning SWP3s – should not depend on any particular permittee's goodwill and agreement.

Finally, IDEM's assertion in the Fact Sheet that the SWP3 maintained at the Refinery can be made available on request to IDEM is not consistent with past practice in Commenters' experience. The Fact Sheet states,

> Part I.E.2.d(2) of the permit requires that the permittee retain a copy of the current SWPPP at the facility and it must be immediately available, at the time of an onsite inspection or upon request, to IDEM. Additionally, interested persons can request a copy of the SWPPP through IDEM. By requiring members of the public to request a copy of the SWPPP through IDEM, the Agency is able to provide the permittees with assurance that any Confidential Business Information contained

within its SWPPP is not released to the public.

Commenters filed two public records requests with IDEM prior to submitting these comments, both requesting disclosure of Applicant's SWPPP for the subject facility. Neither of these requests was granted by IDEM, and the facility's SWPPP was never disclosed to Commenters.

Response 1:

The permit includes numeric effluent limitations for Total Organic Carbon based on the technology based effluent limitations for the Lube Subcategory found in 40 CFR 419.23(f) and Oil and Grease based on IDEM water quality standards. These limits are considered best professional judgement. IDEM has revised Part I.D of the permit. This provision now includes special conditions which implement the SWPPP and are necessary to meet the numeric effluent limitations for Outfalls 003 and 004. These provisions were previously included in Part I.D (Storm Water Pollution Prevention Plan Requirements) of the 2007 permit. This provision is consistent with 40 CFR 122.44(k)(4)(regarding the use of storm water controls that are reasonably necessary to achieve the effluent limits and standards or to carry out the purposes and intent of the Clean Water Act).

Because of staff workload and resources, generally, IDEM does not require the SWP3s to be submitted to our office. They are kept on site and available to IDEM/EPA inspectors to review during site visits. However, in this case, IDEM has modified the permit in the General Requirements portion of the SWP3 in Part I.E. of the permit to require BP to submit a copy of the SWP3 to the Industrial NPDES Permit Section. In addition the following language was added to the Storm Water Special Conditions Section Language in Part I.D. of the permit:

At least once every 12 months from the effective date of this permit, BP must review the selection, design, installation, and implementation of the control measures to determine if modifications are necessary to meet the effluent limitations in this permit. BP must document the results of each review in a report that shall be retained within the SWP3. BP must also submit the report including any updates to the SWP3 to the Industrial NPDES Permit Section on an annual basis, no later than April 1st of each year. The SWP3 will then include the updated non-numeric effluent limitation requirements.

Comment 2:

Condition I.D.1 Undermines the Required BAT/BCT/BPT Stringency of Non-Numeric Stormwater Effluent Limitations and Monitoring Requirements

The statutory basis for the required effluent limitations for stormwater control are found in the Act's requirements for technology-based effluent limitations ("TBELs") and in IDEM's rules for applying those requirements. When determining what level of effluent control limitation should be achieved by the non-numeric

stormwater effluent limitations and monitoring requirements, Applicant is bound by the CWA regulatory provisions and Indiana rule requirements on what stringency constitutes BAT/BCT/BPT.

Condition I.D.1 is an unsatisfactory description of the statutory level of required BAT/BCT/BPT-level control of stormwater effluent, for two reasons. First, the condition language focuses the inquiry on what stormwater control measures are "technically available" rather than on what measures are "technically achievable" in addressing the technology-forcing aspects of BAT/BCT/BPT effluent limitation control. Second, it introduces the phrase "in light of industry practice." Since selection of BAT/BCT/BPT effluent limitation control stringency already considers alternative control methods in the determination of the required stringency of controls, restricting consideration of available controls only to the petroleum refining industry as articulated in a 'best industry practice' is a restriction on the scope of application of all available controls on stormwater that is inconsistent with a properly carried out BAT/BCT/BPT effluent limitation control stringency determination.

Response 2:

This permit contains effluent limits that correspond to required levels of technology-based control (BPT, BCT, BAT) under the CWA. Where an effluent limitation guideline or NSPS applies, the requirement must be incorporated into the permit as an effluent limitation. These limits are included as applicable in the permit. Where EPA has not yet issued an effluent limitation guideline, the appropriate technology-based level of control is to be determined based on best professional judgment. CWA section 402(a)(1); 40 CFR § 125.6. The draft permit conatins numeric effluent limits based on BPJ. The provisions at issue have been removed from the permit.

Comment 3:

BAT/BCT/BPT-Compliant Stormwater Non-Numeric Effluent Limitation Controls as Required Work Practices are Not Enforceable in the Absence of Work Practice Record-Keeping Requirements

IDEM's Draft Permit contains no work practice record keeping requirements in association with the non-numeric stormwater effluent limits contained in Section I.D. of the Draft Permit. When BAT/BCT/BPT stormwater effluent limitations are stated as required work practices, such effluent limitations are not enforceable when no 'monitoring' in the form of record keeping requirements are imposed in carrying out the mandatory work practices stated in the stormwater control effluent limitations section.

Response 3:

Both Parts I.D. and I.E. have requirements for documentation and reporting in order to demonstrate compliance.

Comment 4:

IDEM Must Require Best Available Technology for Nonconventional and Toxic Pollutants as Determined by Best Professional Judgment Review

Sections 301 and 402 of the CWA, 33 U.S.C. §§ 1311 & 1342, require IDEM to establish numeric effluent limitations based on BAT for non-conventional and toxic pollutants discharged by the Refinery before issuing any NPDES permit that authorizes such discharges. *See* 33 U.S.C. § 1311(b)(2)(A)(i) (point sources "shall" achieve "effluent limitations" that "shall require application of" BAT to reduce pollutant discharges to the maximum extent "technologically and economically achievable," including "elimination of discharges of all pollutants" if it is achievable); *id.* § 1342(a)(1) (requiring that NPDES permits may only be issued "upon condition that" they ensure that, *inter alia*, the requirements in 33 U.S.C. § 1311 are met).

Federal regulations promulgated by USEPA likewise require that "[t]echnology-based treatment requirements under Section 301(b) of the [CWA] represent the minimum level of control that *must be imposed*" in a NPDES permit. 40 C.F.R. § 125.3(a) (emphasis added). BAT is a stringent treatment standard that has been held to represent "a commitment of the maximum resources economically possible to the ultimate goal of eliminating all polluting discharges." *EPA v. Nat'l Crushed Stone Ass'n*, 449 U.S. 64, 74 (1980).3

Because USEPA's applicable Effluent Limitation Guidelines ("ELGs") for Petroleum Refineries[4] do not yet include BAT limits for specific pollutants discharged by Applicant's petroleum refinery facility, USEPA regulations require IDEM to use its best professional judgment ("BPJ") to set BAT TBELs for these discharges. 40 C.F.R. § 125.3(c)(2), (d) ("to the extent that EPA-promulgated effluent limitations are inapplicable," NPDES permit writers "*shall apply* the appropriate factors listed in § 125.3(d)" to set case-by-case technology-based effluent limitations based on BPJ) (emphasis added); *see also* 327 IAC 5-5-2.

The Refinery was an existing source as of the date of the 1972 passage of the CWA amendments creating the BAT requirement for such existing sources, including the required case by case BAT effluent limitations determined through BPJ for nonconventional and toxic pollutants. Under these provisions, IDEM was required to bring the Applicant into compliance with BAT-BPJ requirements through imposition of effluent limitations in permits by a date not later than March 31, 1989.[6]

IDEM itself acknowledges in the Fact Sheet its obligation to establish BAT TBELs based on BPJ under Clean Water Act § 301, and that this obligation is separate and independent from its obligation to establish water quality based effluent limitations ("WQBELS") under Act § 302. The Department stated as follows:

> Two categories of effluent limitations exist for NPDES permits: Technology- Based Effluent Limits (TBELs) and; Water Quality-Based Effluent Limits (WQBELs). TBELs are developed by applying the

> National Effluent Limitation Guidelines (ELGs) established by USEPA for specific industrial categories TBELs are the primary mechanism of control and enforcement of water pollution under the Clean Water Act (CWA). Technology based treatment requirements under section 301(b) of the CWA represent the minimum level of control/treatment using available technology that must be imposed in a section 402 permit [40 CFR 125.3(a)].
>
> In the absence of ELGs, effluent limits can also be based upon Best Professional Judgment (BPJ). Accordingly, every individual member of a discharge class or category is required to operate their water pollution control technologies according to industry-wide standards and accepted engineering practices. This means that TBELs based upon a BPJ determination are applied at end-of-pipe and mixing zones are not allowed [40 CFR 125.3(a)]. Similarly, since the statutory deadlines best practicable technology (BPT), best available technology economically achievable (BAT) and best conventional control technology (BCT) have all passed; compliance schedules for these TEBLs are also not allowed. WQBELs are designed to be protective of the beneficial uses of the receiving water and are independent of the available treatment technology.

Fact Sheet at 21-22. This statement was specifically made with respect to mercury, but IDEM presents no reason – because none exists – why this law does not apply equally to other pollutants covered by 33 U.S.C. § 1311(b)(2)(A)(i).

IDEM's Failure to Set BAT-BPJ Limits Leaves Multiple Pollutants with No Limits at All

IDEM was required to ensure Applicant's refinery wastewater discharges complied with BAT-BPJ emission limitations contained in an issued NPDES permit for non-conventional and toxic pollutants [for which no effluent limitations guidance was published] by 1989.

However, Applicant's currently effective 2007 NPDES Permit shows IDEM failed to comply with required BAT-BPJ effluent-limitation-setting requirements for several pollutants known to be discharged by Applicant's facility and many other petroleum refineries.

The obligation applies regardless of the fact that IDEM has deferred applicability of the WQBELs in BP's 2007 permit based on construction of the diffuser. The Act does not allow the timetable for applicability of these WQBELs to impact or diminish he obligation to set TBELs. The statutory authority for establishing WQBELs in NPDES permits provides:

> "(c) Delay in application of other limitations.

> The establishment of effluent limitations under this section shall not operate to delay the application of any effluent limitation established under section 1311 of this title."

33 U.S.C. §1312(c). IDEM's delay in setting WQBELs, and ultimate determination not to do so, therefore may not "...operate to delay the application of any effluent limitation established under section 1311." IDEM's determinations concerning WQBELs do not alter the fact that the Department has to date imposed no TBELs for the subject pollutants.[8]

By implementing the diffuser, the Applicant was effectively allowed to free itself of *all* limits – not only WQBELs, but also any TBELs, since IDEM has expressed no intention (in 2007 or now) to establish them. Specifically, removal of the WQBELs and the effluent monitoring requirements for benzo(a)pyrene, chloride, total copper, total dissolved solids, fluoride, total lead, total selenium, total strontium and sulfate meant no effluent limitations at all neither WQBELs or TBELs – as well as no monitoring requirements were in place for these pollutants.

Commenters note, in addition, that the diffuser cannot be considered BAT providing the basis for a TBEL determination. EPA rules provide that "(e) Technology-based treatment requirements are applied prior to or at the point of discharge." 40 C.F.R. 125.3(e).

B. TBEL Requirements Must Be Established Notwithstanding the Refinery ELG

The Refinery Effluent Limitation Guideline issued in 1979 for petroleum refineries ("Refinery ELG"), while it purported to regulate certain metals through indicator pollutants, made very clear that permitting agencies retain the authority and the duty to regulate unlisted pollutants. It stated in the preamble to the draft ELG (Exhibit 2),

> [T]he fact that these regulations do not control a particular pollutant does not preclude the permit issuer £rom limiting such pollutant on a case-by-case basis, when necessary to carry out the purposes of the Act. In addition, to the extent that state water quality standards or other provisions of state or Federal law require limitation of pollutants not covered by the regulations or require more stringent limitation on covered pollutants, such limitations *must* be applied by the permit issuing authority.

44 Fed. Reg 74525, 74536 (December 21, 1979) (emphasis in original). The preamble further made clear,

> It should be noted that the limitations in this regulation has been developed to cover the general case for this industry. In specific cases, it may be necessary for the NPDES permitting authority to establish permit limits on toxic pollutants which are not subject to limitations in this

regulation.

Id. Clearly, such regulation is required here, where the Refinery has specifically been shown to be discharging the pollutants at issue notwithstanding the controls on the purported indicators. In any event, the ELG preamble was silent as to the ability of controls on pollutants covered in the ELG to collaterally control several of the pollutants listed above. Although it asserts that U.S. EPA "believes that the technology upon which BAT effluent limitations for phenol . . . and chromium are based will effectively control the organic and metallic toxic pollutants listed in Appendix D," Appendix D does not include chloride, fluoride, strontium, or sulfate.

IDEM Failed to Set BAT-BPJ Effluent Limitations for Non-Effluent-Limitation-Guidance-Listed Toxic and Nonconventional Pollutants as Required

The Public Notice, Draft Permit and Fact Sheet contain no TBELs based on BAT-BPJ for non-ELG-listed pollutants of concern. Specifically, Outfall #005 of the Draft Permit contains no BAT-BPJ effluent limitations for selenium, sulfate, total dissolved solids, chlorides, arsenic, lead, manganese, strontium, copper and arsenic.[9]

Additionally, the Draft Permit contains no BAT-BPJ effluent limitation for nitrates. As discussed *supra,* while Applicant implausibly claims to discharge no nitrates, it is evident that Applicant likely discharges over 300,000 lbs. of nitrates per year.

The Draft Permit also contains no BAT-BPJ effluent limitation for total residual chlorine on Outfall #005. Applicant claims it as "believed absent" in the August 2012 permit application. However, Applicant submitted a pre-expansion water flow diagram showing 7.56 MGD of inlet flow which has previously been chlorinated before introduction to the refinery supply main. Under such circumstances the Applicant should be at least required to monitor total residual chlorine on a regular basis unless there is a valid process-related reason for considering that all such reactive chlorine reacts with wastewater hydrocarbons to form other toxicant species within the wastewater system.[10]

Finally, the effluent limitation table of Outfall #005 contains no thermal limitations or thermal monitoring requirements

Response 4:

The NPDES regulation in 40 CFR 125.3 states that permits developed on a case-by-case basis under section 402(a)(1) of the CWA must consider (1) the appropriate technology for the category class of point sources of which the applicant is a member, based on all available information, and (2) any unique factors relating to the applicant. To set BPJ limits, a permit writer must first determine a need for additional controls beyond existing ELGs. The need for additional controls may be the result of the facility not falling under any of the categories for which ELGs exist or discharging pollutants of concern that are not directly or indirectly addressed by the

development of the ELG. It should be noted that prior to establishing BPJ based limits for a pollutant not regulated in an effluent guideline, the permit writer should ensure that the pollutant was not considered by EPA while developing the ELGs.

The EPA-promulgated effluent limitation guidelines for this category of discharger were developed after considering all of the pollutants found in petroleum refinery wastewater and determining the best pollutant parameters to control and limit in the discharge. The federal effluent limitation guidelines did not establish technology based effluent limitations for all pollutants potentially found in petroleum refinery wastewater because they determined it was not necessary or infeasible due to lack of technology or appropriately sensitve test methods i.e. that could allow facility to quantify effluent pollutant levels. Ensuring that BAT is being applied to the wastewater can be achieved through limitations on a specific selection of pollutants.

In 2004, EPA developed a Technical Support Document (TSD) for the Petroleum Refining Industry to support the federal effluent limitation guidelines for this industrial category. The TSD shows how EPA evaluated new information about pollutants that are potentially present in petroleum refining wastewater but not currently limited by the federal effluent limitation guidelines.

A review of the EPA technical support document demonstrated that the Effluent Limitation Guidelines for petroleum refining contains effluent limitations for the appropriate pollutants since EPA did not find it necessaryto modify the Effluent Limitations Guidelines at that time.

IDEM has considered all comments regarding the need to develop case by case BPJ/BAT effluent limits for pollutants found in petroleum refinery wastewater that do not have effluent limits established by the federal effluent limitation guideline for petroleum refining. IDEM has concluded that the existing effluent guideline sufficiently regulates the technology based effluent limitations at this timeand that additional technology based effluent limitations are not necessary.

BP has been modifying their treatment system, including the addition of new tertiary sand filters to reduce TSS to meet water quality based effluent limitations. The new filters have already shown improved treatment performance for TSS. In order to further assess the overall improved treatment performance at the BP Whiting Facility, IDEM has included additional monitoring requirements for some of the pollutants of concern at Outfall 005. IDEM has added the following parameters to the discharge table at Outfall 005 to be monitored at a 2 X Monthly basis: Selenium, Sulfate, Total Dissolved Solids (TDS), chlorides, arsenic, lead, manganese, fluoride, strontium, copper, benzo(a)pyrene, Total Residual Chlorine, and nitrate-nitrite.

Regarding the commentor's thermal concerns, because of how the diffuser impacts the mixing zone, IDEM is confident that the temperature of the effluent from the diffuser will have no negative impacts on the wildlife surrounding Outfall 005. However, to be certain, the permit will require BP to monitor the temperature from Outfall 005 once every month.

Additionally, annual biological surveys of the area surrounding the diffuser have not identified any negative impacts on the wildlife in the vicinity of the diffuser and these annual biological surveys are required during year 1, 3 and 5 of the re-issued permit.

Comment 5:

Mercury

Commenters appreciate all of the effort that BP has made, in collaboration with Argonne National Laboratory and the Purdue-Calumet Water Institute ("Argonne"). We are pleased to see that the evaluated technologies succeeded in removing mercury down to the applicable water quality standard of 1.3 µg/L at both the bench-scale and pilot-scale levels.

At the same time, we are concerned that the renewed NPDES permit issued to BP fully reflect the results achieved by Argonne, and require that they be implemented as soon as possible. Specifically, the re-opener provision must clarify the parameters for determining when the control technology is sufficiently developed so as to require that it be implemented to meet a TBEL. Compliance with this requirement is particularly urgent give that the streamlined mercury variance ("SMV") granted to BP, pursuant to applicable regulations, allows a mercury discharge an order of magnitude higher than the WQBEL limit. The permit must make clear that BP cannot be allowed to indefinitely study the problem if technology is available to reduce its mercury discharge. Additionally, the language describing the next phase of pilot testing should incorporate the specific recommendations from the Argonne research.

Response 5:

Both the Argonne National Laboratory and the Purdue-Calumet Water Institute recommended that further testing be performed at the BP Whiting Refinery before any conclusions are drawn on the appropriate treatment technology to be used for removing mercury from BP's wastewater. IDEM agrees with the commenters that the draft permit's provisions needed to be modified to better reflect Argonne's and Purdue's recommendations. Consequently, IDEM has worked with BP to reach agreement on more thorough permit language to adequately specify the steps that BP will take to (1) study mercury treatment technologies and (2) report the results of that study to IDEM by March 1, 2015. Part III.E of the permit has been substantially revised to include the more thorough permit language that BP has agreed to.

IDEM also agrees that BP should not be allowed to indefinitely study ways to reduce mercury if technology is available to reduce its mercury discharges, and so the permit retains Part I.F.4 from the 2012 permit modification, which states as follows:

> If a treatment technology for the removal of mercury from wastewater is identified and is determined by IDEM to be available and economically viable,

then BP must install and fully operate that treatment technology as soon as possible. Within 6 months after IDEM's determination or the final disposition of any appeal of such determination, whichever is later, BP shall submit a schedule, subject to IDEM approval, for the installation and operation of the identified treatment technology that is as expeditious as possible. Any such determination shall be considered final agency action, which BP may appeal. Upon completion of 12 months of operation, IDEM should modify the permit in accordance with 327 IAC 5-3.5-8 to revise the effective effluent limits for mercury at Outfall 005

IDEM expects that the study that BP performs and the report BP submits to IDEM by March 1, 2015, in accordance with Part III.E of the permit will provide IDEM sufficient information to make the determination called for by Part I.F.4 of the permit that "treatment technology for the removal of mercury from wastewater is . . . available and economically viable." Following such determination, BP will be required to "install and fully operate that treatment technology as soon as possible." Consequently, the permit contains sufficient provisions to address the commenters' concerns that the permit include provisions to ensure that BP is required to install additional mercury treatment technology as soon as possible.

Comment 6:

The Argonne Research Identified Mercury Control Technology on the Cusp of Availability, and Made Specific Recommendations for Further Study

The Argonne researchers looked predominantly at two potential technologies for mercury removal: ultrafiltration ("UF") and reactive filtration ("RF"). Both technologies successfully removed mercury down to 1.3 µg/L. However, UF removed it more consistently than the RF, and there were only minimal technical issues identified with respect to UF that require further exploration.

Regarding the UF technology, the researchers determined,

> The UF membrane pilot unit consistently provided permeate that was less than 0.5 ppt Hg, which met and exceeded the treatment target of 1.3 ppt of Hg. This permeate quality was consistently produced at all tested operating conditions and was independent of the feed water characteristics and feed Hg concentration. This confirms the bench-scale Module 3 findings that there is no fundamental physical or chemical barrier in achieving < 1.3ppt Hg in the tested refinery wastewater at the pilot-scale at least under these testing conditions of little dissolved mercury in the pre-ETL (<0.5—1.05 ppt).

Emerging Technologies and Approaches to Minimize Discharges into Lake Michigan, Phase 2, Module 4 Report ("Pilot Test Report") at iv (Joint Executive Summary), attached as Exhibit 3. Argonne provided a full-scale cost estimate that varied between $39 and $174 million for a 40 MGD design capacity process (varying with criteria used in cost calculations).

The RF technology (called Blue PRO), by contrast, was found to meet the 1.3 µg/L goal 92.7% of the time during the pilot test; and after 46 days of operation experienced "mercury breakthrough" in the effluent which reduced its quality. The researchers were able to restore effluent quality after the breakthrough by adding a chemical, Nalmet 1689, to each filter's influent. The researchers noted that the brevity of test conditions limits their ability to draw conclusions regarding this fix. They also noted that mercury accumulation was seen in the filter sand during Nalmet addition, suggesting a potential long-term efficacy problem. Pilot Test Report at iv-v. The Pilot Test Report also noted that adding the Nalmet before the sand filters was an additional potential option that had not been explored in the pilot study. The cost estimate for the RF technology (including Nalmet added to the influent) ranged from approximately $21 million to $38 million.

Based on these results, the Pilot Test Report specified the additional research that was necessary concerning UF and RF. The only additional research identified as necessary for UF, aside from a longer-term pilot study to confirm the initial pilot results, was additional testing "to determine options for the full scale reject stream which collects and concentrates the mercury removed from the effluent." However, with respect to RF, the researchers specifically recommended, in addition to the reject stream evaluation, additional testing of Nalmet addition. Argonne National Laboratory and Purdue-Calumet Water Institute disagreed as to the order in which this testing should proceed, with Argonne researcher recommending long-term testing of adding Nalmet prior to the sand filters before any further testing of the RF (Blue PRO) technology, but Purdue recommending testing the RF process together with Nalmet addition.. The researchers also noted more generally the representative wastewater samples were difficult to obtain through grab sampling, possibly due to the variability of wastewater composition, and suggested using supplemental composite sampling..

On August 16, 2012, pursuant to the PMPP associated with its SMV, BP submitted to IDEM a report summarizing the pilot study and its recommendations. *See* Letter dated August 16, 2012 to Paul Higginbotham, IDEM, from Linda J. Wilson, BP (Exhibit 4) ("August 16 Letter"). BP's summary was consistent with the description provided above. In terms of its next steps, BP agreed to perform the longer-term UF pilot study recommended by Argonne, including evaluation of options for the reject stream, as well as addition of the composite samples. BP stated that the UF testing would commence August 1, 2013 and conclude March 1, 2015. With respect to RF, however, BP's plans were framed less clearly. It appears from the August 16 Letter that the company is generally willing to conduct additional RF tests, but the Letter does not specify whether it will adopt Argonne's recommendation to test the Nalmet addition before the filters in advance of further testing of the Blue PRO technology, or Purdue's recommendation to test the two technologies in tandem. BP also notes that it will test the efficacy of the Brine Treatment Unit in mercury removal.

Response 6:

See the response to Comment 5.

Comment 7:

The Draft Permit Fails to Adequately Incorporate the Argonne Research Findings

The Draft Permit fails to adequately incorporate these detailed findings and recommendations from the Pilot Test Report. The Draft carries over more or less unchanged the provisions concerning mercury removal testing that were included in the revised NPDES permit incorporating the SMV, even though that revised permit (issued February 2012) predated the publication of the pilot test results (March 2012) and BP's subsequent report concerning them (August 2012). As a result, the Draft Permit does not set forth a coherent plan for ensuring both that further pilot testing follows a well-defined plan consistent with the Argonne research, and that the results of the research be used within a reasonable timeframe to establish a TBEL for mercury regardless of whether the WQBEL of 1.3 µg/L can be met. Commenters are very concerned that the Draft Permit in its current form would allow BP to study the issue of mercury control indefinitely, without ever committing to implement available technology.

Incorporation of Argonne Findings into the PMPP

The Draft Permit adds the following requirement to the PMPP:

1. a. BP will begin operation of such pilot demonstration unit of size as the Purdue/Argonne pilot within eighteen (18) months the NPDES permit modification incorporating the SMV 17, 2013).
   b. Complete the pilot demonstration and submit a final report to IDEM within thirty-six (36) months of the NPDES permit modification incorporating the SMV (February 17, 2015). The pilot demonstration evaluation will include at least the performance under varying weather and process conditions, evaluation of options for waste streams, and reliability, and feasibility. The report to IDEM shall summarize the the pilot demonstration, including reliability and feasibility of piloted mercury removal technology, and recommendations next phase of review.

The Draft Permit also adds a requirement, which Commenters support, that BP test mercury removal at the Brine Treatment Unit. The above language tracks essentially word for word the comparable requirement in BP's pre-existing PMPP, without incorporating any of the specific recommendations by Argonne concerning future pilot testing. Commenters therefore recommend the following language for Part IV.D.1. to capture the Argonne recommendations, as acknowledged by BP in the August 16 Letter (added language underlined):

1. a. BP will begin operation of such pilot demonstration unit of similar the Purdue/Argonne pilot within eighteen (18) months of the permit modification incorporating the SMV (August 17, 2013).

b. Complete the pilot demonstration and submit a final report to IDEM within thirty-six (36) months of the NPDES permit modification incorporating the SMV (February 17, 2015). The report to IDEM summarize the results of the pilot demonstration, including feasibility of the piloted mercury removal technology, and recommendations for the next phase of review. The pilot evaluation shall follow the recommendations of the pilot testing issued in March 2012 by Argonne National Laboratory and Purdue-Calumet Water Institute (Argonne) except as described below, and include at minimum the following:

An evaluation of ultrafiltration technology (using GE ZeeWeed® Technology, 0.04 µm pore size and made up of PVDF) for particulate mercury removal, lasting at least 6 months, and using the protocols and methods employed by Argonne.

(i) An evaluation of the Blue PRO® reactive filtration process for both particulate and dissolved mercury removal, lasting at least 6 months.

(ii) An evaluation of the use of Nalmet® in conjunction with Blue PRO, including but not limited to addition of Nalmet® before BP's sand filters. Such testing shall be conducted either prior to further evaluation of Blue PRO or in conjunction with such evaluation; and BP shall explain in detail in its final report to IDEM the basis for its determination whether to conduct the Nalmet® testing before or in conjunction with further Blue PRO evaluation.

(iii) An evaluation of options for handling of mercury-containing full scale reject and backwash streams.

(iv) Use of grab samples supplemented by composite sampling for rapid preliminary assessment of pilot performance.

(v) Evaluation of performance under varying weather and process conditions, evaluation of options for waste streams, and reliability, operability, and feasibility.

Setting forth this level of specificity will ensure that BP proceeds in its research down a path that is likely to lead to a determination in the reasonably near term concerning permanent installation of mercury control technology. The language above does not create new or restrictive requirements, but merely reiterates the Argonne recommendations acknowledged by BP. To the extent BP may have reason not to follow the Argonne recommendations, it should be required to explain to IDEM and the public their reasoning and basis for an alternative approach.

That said, Commenters remain open to discussing the recommended wording above with IDEM and BP to the extent there are any specific issues raised concerning it. In particular, there are several mercury removal technologies evaluated in the USEPA Draft Report (*see infra* next subsection) that were not considered by Argonne, that USEPA considers to be fully available. To the extent any of those technologies could potentially be deployed at the Refinery to treat its particular effluent, those technologies should be evaluated as well. (Commenters understanding is that the Argonne researchers focused on the UF and RF technologies as particularly appropriate to BP's waste stream.)

Response 7:

See Response to Comment 5.

In regards to further studies of reactive filtration and specifically the Blue PRO® reactive filtration technology, IDEM agrees with BP that further testing of that specific system is not warranted at this time. This is based in part upon the information generated by Argonne /Purdue studies in regards to the use of plain sand versus ferric sulfate coated sand as media in a non-membrane filter and the mercury removal achieved by plain sand being comparable to the coated sand. As described in the revised Section E of the permit, BP will further test the addition of precipitants prior to the final filters. BP is also further studying the mercury levels in commercially available ferric sulfate to determine whether it may add more mercury than it removes from the the effluent and will conduct further testing if warranted.

Comment 8:

Incorporation of Argonne Findings into the Re-opener Provision

The discharge limit in the current permit and Draft Permit is extraordinarily high. While commenters recognize that it is based up the SMV criteria set forth in applicable regulations, the fact remains that this limit – 23.1 µg/L – is close to twenty times higher than the applicable WQBEL. What is more, this limit is an annual average, with no daily maximum limit.

This situation is untenable past the short term as both an environmental and a legal matter. Regardless of the legality of granting the SMV initially (Commenters' concerns with the Indiana SMV regulations are beyond the scope of these comments), the Clean Water Act is clear and IDEM has acknowledged – that, regardless of applicable WQBEL requirements and any variance that may be granted from them, the discharger has a separate, independent obligation to impose a TBEL based on a BPJ determination of BAT. *See supra* Section II. In this regard, Commenters note that the 1979 Refinery ELG is silent concerning control of mercury discharges, leaving no indication that technology-based mercury controls – which are only emerging three decades later in the Argonne research – were ever considered. Additionally, the Refinery ELG, which was last amended in 1985, did not consider and could not have

considered today's prevalence of tar sand crude feedstocks with considerably higher levels of toxic metal constituents than conventionally produced crude. Refineries processing conventional crude were the overwhelming subject of the original Refinery ELG.

It is therefore imperative that mercury control technology be required as a TBEL as soon as it is available. It is not relevant to BAT-BPJ analysis whether that technology is capable of consistently achieving the WQBEL limit, since the WQBEL requirement is wholly separate from the TBEL requirement. Thus, to the extent any technology is determined capable of reducing BP's mercury discharge – whether to the WQBEL level or above it – BP must be required to implement that technology if it meets the criteria set forth in 40 C.F.R. § 125.3(d)(3) for a determination of best available technology.

It is clear from the Argonne research that at least one form of mercury control, UF, is capable substantially reducing the effluent in BP's mercury, and is on the cusp of being ready to deploy at the Refinery. As discussed above, the UF technology consistently achieved a level of mercury in the refinery's discharge that exceeded the quality necessary to meet the WQBEL, and Argonne found "no fundamental physical or chemical barrier" to meeting that standard. Pilot Test Report at iv. The only significant research required to be done at this point to confirm the suitability of this technology is a 6 month pilot test, and an evaluation of options for addressing the reject stream. The RF technology, by contrast, removed mercury less effectively (achieving the WQBEL level only 92.7% of the time), and its efficacy deteriorated over time so as to require the addition of NALMET. The NALMET addition requires further study, and the Argonne National Laboratory researchers have recommended an extended two-phase time frame for such study (study of NALMET addition before the sand filters; and if that testing is successful the subsequent testing of Blue PRO together with NALMET). The RF technology thus appears farther from becoming available than the UF technology.

The RF technology also appears to be potentially less expensive than the UF technology. There is no legal basis, however, for allowing indefinite delay to allow a new, less costly technology to emerge rather implementing a technology that is immediately available. Pollution removal technology prices frequently decline over time, but the Clean Water Act does not define "best available technology" as what may be "best" in the future, but rather as what is "available" now to make progress toward the Act's goals. *See* 33 U.S.C. § 1311(b)(2)(A)(i) (point source pollutant discharge "shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants"). While cost may be considered as one of several factors in the BPJ determination of BAT, *see* 40 C.F.R. § 125.3(d)(3), the test is a stringent one. BAT has been held to represent "a commitment of the maximum resources economically possible to the ultimate goal of eliminating all polluting discharges." *EPA v. Nat'l Crushed Stone Ass'n*, 449 U.S. 64, 74 (1980). Thus, the relevant question in determining BAT is not whether the RF technology may ultimately prove less expensive than the UF technology, but whether the UF technology is available, most effective, and capable of being deployed using the "maximum resources economically possible."

In this regard, we note that it is particularly imperative here that new economic analysis of mercury control technology in the context of a BAT determination be conducted as soon as possible given that the economic analysis upon which the Indiana SMV program is predicated is woefully outdated. In adopting its SMV procedures, Indiana purported to comply with the requirement in 40 C.F.R. § 132 Appendix F it consider the cost criterion for a variance ("substantial and widespread economic and social impact") by making a one-time determination that, given the cost of mercury control technology, that criterion would apply. The State concluded that costs of compliance with the mercury water quality standard would be prohibitive, and relies regulated community comments in support of that conclusion. Those comments rely on a 2002 report by the Association of Metropolitan Sewage Agencies, and a 1997 report by the Ohio Environmental Protection Agency ("OEPA Report"). The OEPA Report, in turn, relied upon analysis of then-current technology including biologically activated sludge, chemical precipitation, ion exchange, and reverse osmosis in concluding that the cost of mercury removal would be prohibitive. Clearly, as the Argonne research has demonstrated, an entirely new set of technologies now exists with very different economics. The OEPA Report calculation also did not evaluate the economic feasibility of mercury removal in a particularly meaningful or readily applicable manner, setting forth only a cost per pound of mercury removed rather than, as did Argonne, a capital cost for a system sized for the Refinery.

Additionally, USEPA is currently conducting its own analysis of mercury removal technologies to update the OEPA Report, and issued a draft report in April, 2012 ("USEPA Draft Report"). That report evaluates in detail the technical and cost-effectiveness of the technologies that have emerged since 1997 to control mercury (including those evaluated by Argonne), and provides a detailed cost assessment of each. With respect to UF technology, the USEPA Draft Report concludes that for a discharge of less than 20 mgd (the discharge from Outfall 005, for which mercury limits are imposed, is 15.7 mgd, UF costs are "relatively low."

For all of these reasons, Commenters are pleased that a reopener provision was included in the Draft Permit, requiring that if a mercury technology is determined to be "available and economically viable," the Permit must be re-opened to require that such technology be implemented. Draft Permit at 28. However, this reopener provision provides no specifics as to how and when BP is to make such a determination of availability and viability, once again raising the specter of a research process that will continue indefinitely without the need for action as soon as possible. The reopener should be revised to clarify what is meant by "available and economically viable," and how such determination will be guided by the pilot tests that BP is required to conduct.

Accordingly, Commenters recommend the following language for the reopener concerning mercury (changes underlined):

> If a treatment technology for the removal of mercury from wastewater is identified and is determined by IDEM <u>to meet the criteria in 40 C.F.R. § 125.3(d)(3) for a determination of best</u>

available technology, and/or be capable of meeting the water quality based effluent limit set forth in Part I.A.1, then BP must install and fully operate that treatment technology as soon as possible. In making such determination, IDEM shall specifically determine whether the Final Report submitted by BP pursuant to Part IV.D.1.b. reflects that any technology evaluated was effective in reducing the mercury in BP's waste stream beyond the levels of removal currently being achieved by the PMPP, in which case IDEM shall require that BP implement such technology unless it does not meet the 40 C.F.R. § 125.3(d)(3) criteria for a determination of best available technology.

Within 6 months after IDEM's determination or the final disposition of any appeal of such determination, whichever is later, BP shall submit a schedule, subject to IDEM approval, for the installation and operation of the identified treatment technology that is as expeditious as possible. Any such determination shall be considered final agency action, which BP may appeal. Upon completion of 12 months of operation, IDEM should modify the permit in accordance with 327 IAC 5-3.5-8 to revise the effective effluent limits for mercury at Outfall 005.

40 CFR part 125.3(d) In setting case-by-case limitations pursuant to § 125.3(c), the permit writer must consider the following factors:
(3) *For BAT requirements:* (i) The age of equipment and facilities involved;
(ii) The process employed;
(iii) The engineering aspects of the application of various types of control techniques;
(iv) Process changes;
(v) The cost of achieving such effluent reduction; and
(vi) Non-water quality environmental impact (including energy requirements).

Commenters are aware that IDEM and BP engaged in discussion with USEPA Region 5 during the course of drafting the SMV NPDES modification concerning the reopener provision. However, those discussions pre-dated that March 2012 Pilot Test Report, which produced extremely positive results with respect to UF technology, providing reason to believe that it may be considered available following the next round of pilot tests. It is therefore important that the reopener provision be revised to reflect that new reality.

Finally, Commenters note the possibility that has been raised that a TBEL developed in accordance with the re-opener provision could temporarily co-exist in the permit with the existing WQBEL developed in accordance with the SMV process, with the TBEL being the more stringent of the two. As discussed above, the TBEL and WQBEL requirements exist independently from one another. There is no legal or logical reason why the existence of a WQBEL that has been relaxed through a variance should obviate the need for a TBEL. The requirement for a WQBEL is triggered when a TBEL proves insufficient to meet water quality

standards, 33 U.S.C. § 1312, and that continuing requirement is reflected in the final WQBEL of 1.3 µg/L that remains in the permit. *See* Permit Section I.A.1. No reasonable reading of the statute could allow that the TBEL requirement be rendered a nullity simply because the more stringent WQBEL has been temporarily raised above the level that BAT could effectively meet. It is clear that the TBEL would be the controlling standard until and unless the WQBEL of 1.3 ug/L can be met, at which point the SMV will no longer be operative. In any event, it appears likely based on the Argonne research that the technology being developed through pilot testing is capable of meeting the WQBEL, so the question may well turn out to be moot.

Response 8:

As explained in the response to comment 5, the requirement in Part I.F.4 of the permit that "BP must install and fully operate [treatment technology that IDEM determines is "available and economically achievable'] as soon as possible," in conjunction with the more thorough study and reporting requirements in Part III.E of the permit that will provide IDEM with the information necessary to make the determination in accordance with Part I.F.4 of the permit, ensures that BP will be required to install any additional treatment technology that would satisfy any BPJ-based best available technology requirements.

It should be noted that IDEM conducted a review of the reported data for Mercury to determine if the proposed interim limit of 23.1 ng/l is still representative of the quality of the effluent from Outfall 005 for the more recent monitoring period;January 2012 to the present. Since February, 2012, the highest daily concentration of mercury from Outfall 005 is 8.75 ng/l (4-30-2012).

IDEM proposes to reduce the interim limit for mercury to 8.75 ng/l in accordance with 327 IAC 5-3.5-8 because BP has demonstrated since 2012 that they are capable of consistently achieving a concentration of 8.75 ng/l or less from Outfall 005 as an annual average on a yearly basis.

Comment 9:

Cooling Water Intake

Applicant's two cooling water intake structures ("CWIS") in Lake Michigan have long been subject to non-discretionary requirements of the Clean Water Act binding on IDEM to evaluate whether the intake structures and cooling water practices utilized at the Refinery comply with the following statutory criteria set forth in Act § 316(b):

"(b) Cooling water intake structures

Any standard established pursuant to section 1311 of this title or section 1316 of this title and applicable to a point source shall require that the location,

design, construction, and capacity of cooling water intake structure reflect the Best Technology Available for minimizing adverse environmental impact.

Applicant's CWIS are existing structures which are not subject to the Phase II rules at 40 C.F.R. 125.9 implementing 316(b), but they are nevertheless subject to the following requirement of a BPJ determination:

"(b) Existing facilities that are not subject to requirements under this or another subpart of this part must meet requirements under section 316(b) of the CWA determined by the Director on a case-by-case, best professional judgment (BPJ) basis."

IDEM is thus required to make a determination addressing Applicant's CWIS, and as whether the design, operation and monitoring of such equipment as shown in Applicant's submittal constitutes Best Technology Available ("BTA") for "minimizing adverse environmental impact" under 33 U.S.C. §1326(b). The design, operation, performance and monitoring of the CWIS are all indisputably considered as elements of the required professional engineering determination reflecting scientifically defensible BTA-BPJ findings and decisions addressing whether Applicant's present CWIS performance accomplishes a BTA level of "minimizing adverse environmental impact."

U.S.C. In considering its CWIS BTA decision, IDEM must also consider and address the fundamental purpose of the Clean Water Act "...to restore and maintain the chemical, physical and biological integrity of the Nation's waters. The determination IDEM must make under 33 §1326(b) as to adverse environmental impact must necessarily address the remedial and restorative goals of the Act as to the biological integrity of Lake Michigan as the navigable waters in which Applicant operates their CWIS.

In this section, Commenters address both Applicant's submittal addressing the CWIS matter, and IDEM's findings and determinations on the BTA determination addressing Applicant's cooling water intake structures. As demonstrated below, Applicant has completely failed to demonstrate that its primitive intake system even approaches BTA for minimizing aquatic life impacts. These structures lack even inlet screens to reduce aquatic life mortality – which is 100% for organisms entrained within the CWIS. Such intake screens – as well as many other types of protective measures – are widely available and considered part of BTA. Yet IDEM's analysis failed entirely to consider such technology or the possibility that it might be BTA. Its purported BPJ determination did not even assess the aquatic life harm being caused by BP's current CWIS structure, such as an evaluation current fish mortality levels; and included no analysis as to whether improvements in that structure could mitigate harm.

Applicant's August 2012 Cooling Water Intake Structure Documentation is Insufficient to Support a BTA-BPJ Determination

Applicant's CWIS Documentation Contains No Demonstration that the of Compliance with §316(b) Requirements

In August 2012, Applicant submitted documentation to IDEM addressing the cooling CWIS being utilized at the Refinery site.

While the documentation acknowledged that IDEM was to conduct a Best Technology BTA determination determined by BPJ, no part of the Applicant-submitted documentation contains any specific claims and/or demonstrations by the Applicant that their CWIS equipment actually complies with CWA Section 316(b), or that the subject CWIS equipment as presently used at the refinery meets a BTA-commensurate level of protectiveness for "...minimizing adverse environmental impact..." and for restoring the biological integrity of Lake Michigan in which Applicant operates its CWIS. Commenters are not aware of any documents from the Applicant that clearly and unambiguously state Applicant's conclusion whether the present design and operational practices for its two Lake Michigan CWIS intakes (as shown in the August 2012 CWIS Documentation) comply with the objectives and provisions of 33 U.S.C. §1326(b) read together with the Act's purposes in restoring the biological integrity of Lake Michigan.

Applicant's brief CWIS documentation consists solely of physical and operational descriptions of the cooling water intakes structures, the flumes and tunnels to Lake Michigan, the pumping station physical features and the results of a diver inspection to determine intake facial inlet plane orthogonal velocities, along with supporting schematic diagrams showing Applicant's current CWIS installations. This documentation contains no quantitative or qualitative information addressing the present breadth and extent of biological damages and impairment to fish and aquatic organisms caused as a result of Applicant's CWIS operations in Lake Michigan. IDEM Office of Water Quality (OWQ) permitting staff have verified that Applicant has never submitted any information addressing the present or historical levels of Applicant-CWIS-caused biological damage to aquatic life from Lake Michigan and that IDEM has not requested such information from Applicant.

Applicant's CWIS Documentation Fails to Include Information Addressing the Manner in Which Applicant's Present CWIS Causes or Contributes to Aquatic Mortality Impingement and Entrainment Losses

While the Applicant provides a large amount of physical information about the CWIS in question, none of the information or analysis describes any of the modalities for fish and aquatic biological damage that is caused or created by the physical and operational elements of Applicant's CWIS intake processes and operations. In a proper determination and demonstration of compliance with 33 U.S.C. §1326(b), IDEM must properly consider the manner and modality of impingement and entrainment mortality losses caused by the present physical configuration of Applicant's CWIS equipment and operations because such biological damages are a part of the process of 'minimizing adverse environmental impacts in the form of fish and aquatic fauna mortalities.

Because an IDEM BTA-BPJ determination must be reviewed as to whether it is a properly articulated and scientifically defensible exercise in environmental engineering, such a determination must necessarily consider the degree and manner in which the physical elements and operational features of CWIS equipment cause or contribute to impingement and entrainment aquatic mortality. No part of Applicant's CWIS documentation provides the information needed for a proper engineering judgment and determination on Applicant's CWIS in meeting the requirements of 33 U.S.C. §1326(b) and the required BPJ review.

Applicant's Failure to Operate Continuous Volumetric Flow Monitoring Devices Sufficient is Not Compatible with a Proper BTA-BPJ Determination

Applicant's CWIS documentation indicates that no direct-stream CWIS volumetric flow monitoring is done at the facility. Its methodology of monitoring the flow in the intakes is to do so by using two general groups of calculations rather than direct continuous physical parameter monitoring in intakes and tunnels. The first group of calculations addresses discharge effluent flow monitoring together with calculated water losses within the refinery and back calculates the total intake flow rate from both intakes combined. The CWIS documentation does not disclose or indicate such calculations and how they were carried out.

The second group of calculations addresses flow proportioning ratios that apportion the total combined intake flow rate from the first group of calculations between the 1911 and 1942 intake tunnels. The results of the second group of calculations lead to Applicant's depiction of a generally applicable operational assumption that the flow rate apportions 67 percent to the 1942 flume and 33 percent to the 1911 flume under all conditions. No justification or calculations support Applicant's claim that the stated flow proportioning stays constant between the two tunnels.

Applicant's intake flume flow monitoring approach is not acceptable because a non-demonstrated, unapproved and undisclosed total volumetric flow calculation methodology and tunnel volumetric flow rate proportioning assumption does not demonstrate a 'best' technology approach to intake process monitoring to address "minimizing adverse environmental impacts." Nothing about Applicant's calculated tunnel volumetric rate determination and monitoring methods demonstrates that Applicant's procedures and calculation methods are the "best" technology available and a basis for rejecting demands on the Applicant that continuous volumetric parameter monitoring equipment be installed in both intake tunnels to Lake Michigan. Nothing in the CWIS documentation can be considered as an Applicant showing that such individual flume flow monitoring is either technically or economically infeasible.

As part of permit-required monitoring measures necessary for Applicant's compliance, IDEM should require the Applicant to install continuous volumetric flow rate monitoring equipment in each CWIS intake flume and to maintain such a requirement as a permit-specified effluent limitation for CWIS operational

monitoring. In addition, IDEM should require a showing and demonstration of how flume volumetric monitoring is related to keeping the maximum CWIS intake facial plane orthogonal flow velocity below any required, recommended and/or pre-determined velocity thresholds for fish and aquatic biological protection.

Applicant's Supporting Calculations and Methodologies in the CWIS Documentation are Undisclosed, Unsupported, and/or Inadequate

As noted in the prior sections, Applicant carried out two groups of calculations in support of its CWIS Documentation, but Applicant did not submit or disclose any such calculations or methodologies it used in making its determination. The entire theory of IDEM's determination of Applicant's CWIS compliance with BTA for the present facility depends on the process operational guarantee that acceptable intake facial plane orthogonal velocities will be maintained through Applicant's discharge flow-based back-calculation methodology and individual tunnel flow apportionment of the total flow based on a fixed calculated assumption.

Commenters thus object to IDEM's finding that Applicant's CWIS documentation is part of a complete and approvable application when none of the underlying calculations and methodologies were submitted for review and BTA determination by the Applicant. Commenters further object to the speculative nature of Applicant calculation approaches and Applicant's failure to show, consider or explain how Applicant's overall approach to volumetric intake rate determination constitutes an accurate assessment method.

Response 9:

As part of this permit renewal, IDEM made a BPJ determination that the CWIS at the BP Products North America, Inc. – Whiting Refinery are equivalent to BTA. The determination was made based on an evaluation of the available information. The low intake velocities measured at the CWIS intakes support a determination of BTA. The permittee provided average intake velocity data showing velocities of 0.26 fps and 0.56 fps at intakes 1942 and 1911, respectively. Based on the Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule (EPA-821-R-11-001) dated March 28, 2011, at a velocity at or below 0.5 fps, most fish can swim away from cooling water intakes. The location of the cooling water intake structures (CWIS) in areas off shore reduces the number of fish that are potentially affected by the CWIS due to the much lower fish population in the off shore areas compared to the fish population in the near shore areas where CWIS are typically located. IDEM also considered the water withdrawal reduction achieved by the existing cooling towers employed a the facility and the proposed cooling towers that will further reduce the withdrawal of cooling water.

The number of fish that are impinged or entrained by the existing CWIS is not well documented, therefore IDEM will require the permittee to submit to IDEM for review and approval a fish impingement, entrainment and mortality minimization alternatives evaluation for each CWIS at the Whiting Facility. At a minimum, the evaluation must

include an assessment of installation of debris screens, and consideration of a separate fish and debris return system and include time frames and cost analysis to implement these measures. As part of this a characterization of the types of fish species will be required. The permittee shall submit the fish impingement, entrainment and mortality minimization alternatives evaluation to IDEM within 24 months from the effective date of this permit for review and approval. The fish mortality minimization alternatives evaluation shall include the feasibility of installing a fish return to Lake Michigan. (See Permit Part III.B.2.)

The fish impingement, entrainment and mortality minimization alternatives evaluation will be used to reevaluate the BTA determination during the next permit renewal cycle.

Comment 10:

Applicant Failed to Submit CWIS Documentation Drawings and a Detailed Showing of the Physical Configuration of its Intake Chlorination System on the 1942 Flume CWIS and Information Necessary to Determine that Heated Chlorinated Solutions are Not Discharged to Lake Michigan

> Applicant's CWIS Documentation the 1942 intake configuration indicates as follows:

In the early 1980s, a frazzle ice and biological fouling prevention system was put in place. Hot water and chlorine solution are pumped out to manifolds running the circumference of the intake in order to reduce ice and biological growth.

However, the Applicant did not provide any drawings or other technical information showing the exact location and placement of the hot water/chlorine solution 'manifold' and its placement geometry with respect to the facial openings in the 1942 flume CWIS intake as shown on either Figure 3 or 5 of Applicant's submitted CWIS documentation . No information was provided on the volumetric rate of feed of the heated, chlorinated water delivered to chlorination manifold for release on the 1942 CWIS facial intake openings. In the absence of a specific drawing addressing the placement of the subject manifold and detailed information showing such information as the rate of heated, chlorinated water addition and the relationship between flow rates of chlorinated water and the relative rates of intake volume, there can be no assurance that the manifold will not cause a discharge of total residual chlorine to Lake Michigan as receiving waters.

In addressing the potential for the anti-fouling chlorinated solution discharge, Applicant must also simultaneously address and conform its claims that the design and operation of its intakes will not also entrain fish and aquatic life at the facial plane of the intake inlet openings.

In making any showing by Applicant that the design and placement of the chlorinated hot water solution injection manifold does not discharge to Lake Michigan in a manner that escapes the CWIS, Applicant should also be required to

show and address what effect the chlorinated solution injection apparatus has on fish that are in or near the edges of the facial plane of the CWIS intake opening. Applicant must not be allowed to operate an anti-fouling system having the effect of impairing the ability of fish to escape entrainment flow at or near the CWIS facial plane intake opening.

IDEM's Fact Sheet indicates the Applicant plans to maintain a 0.25-0.5 mg/l total residual chlorine concentration within the refinery water supply system. The upper bound concentration is 26 times the present Indiana CMC (Maximum) water quality standard of 19 µg/L for total residual chlorine. Because the anti-fouling solutions used by the Applicant will be acutely toxic to fish and aquatic life it is essential that the Applicant be required to provide absolute clarity as to whether or not any portion of the flow of anti-fouling solutions at the 1942 CWIS will be discharged to Lake Michigan at the facial intake surfaces. The draft permit should not issue without providing such information for review and verification that Applicant's intake chlorination manifold is not operating as a de facto additional outfall for a total residual chlorine contaminated discharge stream discharged to Lake Michigan.

Applicant's documentation also did not mention any intake chlorination on the 1911 flume. IDEM's Fact Sheet mentions zebra mussel control on p. 42, but does not say that such activities are carried out on the 1911 intake. The intake chlorination status of the smaller intake should be clarified on the record during IDEM's subsequent consideration of Applicant's permit.

Response 10:

Both of the CWIS structures (1911 and 1942) are chlorinated by BP. BP has verbally described the chlorination system to IDEM, but BP has not provided any engineering drawings of the chlorination system. BP described the chlorination system as being a ring like structure that sits on top of each CWIS and slowly releases chlorine to the intake water immediately prior to the water being drawn into the CWIS. See Response 22.

Comment 11:

Applicant's Single Day Diver Inspection and Measurement of Facial Plane Orthogonal Flow Velocities Does Not Constitute a Continuous, Direct & Real Time Volumetric Parameter Monitoring and Verification Method

Applicant's CWIS Documentation contains the results of a diver inspection and measurement of the facial plane or orthogonal intake flow velocities during a single day of refinery operation when the combined total flume flow rate for the 1911 and the 1942 CWIS was indicated as 85 MGD. As part of its single day demonstration and CWIS documentation, the Applicant also calculated (and did not measure) the flow proportioning between the two CWIS intake flumes. Applicant calculated the flow proportioning at 33% for the 1911 tunnel/intake and 67% for the 1942 tunnel/intake,

but no such calculations and methodologies were provided by Applicant in the documentation.

The CWIS documentation contains the results of the diver intake inlet facial plane orthogonal intake velocity measurements, and shows these on page 4 and in figure 5. Applicant's submitted diver inspection and velocity measurements portray the two CWIS intakes with a specific level of performance that Applicant intrinsically claims as being acceptable when measured on November 13, 2009 while operating at a calculated combined total intake rate of 85 MGD. However, nothing about this submitted information and inspection assures that the intakes will operate at all times with maximum and/or average facial intake velocities less than those observed on November 13, 2009 at the respective two Lake Michigan intakes.

For example, the average combined flow reported for 2009-2001 is 92 MGD. Non- firewater pumping unit capacity is 117.8 MGD for No. 1 Water Station and 146.3 MGD for No. 2 Water Station. Nothing about the submitted diver inspection information ensures that Applicant will be able to maintain the same or similar CWIS facial plane intake velocities under all facility operating and plant production rate conditions. Applicant is *not* accepting a limit of 85 MGD per day for total CWIS intake daily volumes.

Specifically, nothing about Applicant's submittal ensures that the facility will have the same or similar CWIS intake facial plane velocities while the facility is operating at the maximum physical pumping process rates for both non-firewater and firewater pumps. Nothing in Applicant's submittal establishes a functional relationship between CWIS intake facial plane normal velocities and hourly volumetric intake process rates in both the 1911 and 1942 intake tunnels. Without direct tunnel volumetric flow measurement as parameter monitoring for CWIS operation for intake facial plane orthogonal velocity flow control and without a clear mathematical relationship between refinery water demand and such facial velocities, nothing about Applicant's CWIS documentation provides a basis for ensuring that CWIS operations do not have unacceptable facial plane orthogonal velocities under all water intake tunnel volumetric rates and typical rate variability.

Response 11:

IDEM has modified the CWIS study in Part III of the permit to require flow monitoring of the water intake as measured at the pump station and as measured at both of the CWIS to establish a relationship between total intake flow and the calculated intake velocity at both of the CWIS. The purpose of this study is to establish a maximum flow above which the intake velocity at the CWIS will exceed 0.5 feet per second. That flow value may be established in the permit as a maximum allowable intake flow velocity at the intake pumps.

Comment 12:

Applicant's CWIS Documentation Fails to Identify and Quantify the Total Intake Facial Plane Area for the 1911 and 1942 CWIS

A key and important parameter for evaluating CWIS physical configurations is the total intake facial plane area for each of the 1911 and 1942 CWIS. Applicant should be required to specifically state the total inlet area for each of the two intake units.

Response 12:

For the purposes of making a BTA determination using BPJ for this permit renewal, IDEM had enough documentation to determine that the intake velocities at the CWIS are low enough (<0.5 feet per second) to approve the CWIS at this time. Identification and quantificaiton of the Total Intake Facial Plane Area was not necessary to make this determination

See Response 11.

Comment 13:

Review of Applicant's November 13, 2009 CWIS Intake Facial Plane Orthogonal Velocities and Assumed Volumetric Flow Rates and Flow Proportioning Shows Inconsistency and Implausibility on Applicant's Calculated Combined Intake Daily Flow Volumes and Flow Proportioning Percentages Ratios

Applicant calculated an 85 MGD combined total intake volumetric flow rate for the day of the diver inspection and intake facial plane velocity measurements on November 13, 2009. Applicant's unmeasured but calculated flow proportioning result is 33% of combined total flow rate for the 1911 intake and 67% of combined total flow rate for the 1942 intake. At this flow rate proportioning, the 1911 inlet volume would be 28 MGD and the 1942 inlet volume would be 57 MGD for the November 13, 2009 day of operations when diver measured intake facial plane orthogonal velocities were determined on both of Applicant's CWIS inlets.

To check this calculation, Commenters used Applicant's measured CWIS facial velocity data to estimate by calculation the volumetric flow rate at each intake implicit to the facial velocity detected in the diver inspection on November 13, 2009. See Exhibit 8 for Commenters determination of the total CWIS facial inlet area for both intakes and for Commenters' volumetric calculations. Commenters determined the 1911 intake facial plane opening area as 55 square feet. At the 1911 intake inlet facial plane normal velocity of 0.56 ft/sec, Commenters calculate an estimate of the 1911 intake volumetric rate on November 13, 2009 to be 19.9 MGD. Commenters additionally determined the total 1942 intake facial plane inlet opening area as 480 square feet. At the November 13, 2009 average 1942 intake inlet facial plane normal velocity of 0.26 ft/sec, Commenters calculate an estimate of the 1942 intake

volumetric rate on November 13, 2009 to be 80.7 MGD. These conclusions are summarized in the table below:

	1911 Intake	1942 intake
Applicant's determination of volumetric rates on 11/13/2009 using 85 MGD combined total and Applicant's calculated 33-67 proportioning ratio	28 MGD	57 MGD
Commenters' calculated estimate of 11/13/2009 intake volumetric rates based on diver-measured CWIS intake inlet velocity determination and Commenters' determination of total inlet facial	19.9 MGD	80.7 MGD

As shown in the table, Commenters' calculated estimates demonstrate volumetric rates that are considerably less than Applicant's volumetric rate determination for the 1911 intake and considerably greater than Applicant's volumetric rate determination for the 1942 intake.
There is thus good reason to question Applicant's calculation methods and the potential of such methods to propagate erroneous determination of intake inlet volumetric rates.

Response 13:

IDEM has reviewed the calculations used by BP to estimate the volumes from each of the CWIS and IDEM has concluded that they are the equivalent of an engineering estimate. However, IDEM agrees that more flow measurement data is needed to determine the flow velocity at the CWIS intake openings and the relative flow entering each of the CWIS.

The permittee may be required to submit additional or updated methodology during the next permit renewal.

See Response 11.

Comment 14:

Applicant's CWIS Documentation Contains No Information, Review or Narrative Addressing Efforts at Intake Flow Reduction

While the Applicant's NPDES application mentions two new cooling towers as part of the facility expansion and modifications, nothing in the CWIS documentation addresses Applicant's obligation to consider alternatives to reduce or mitigate intake fish damages by increasing the use of closed cycle cooling towers at the Whiting Refinery. There is no demonstration or adequate showing provided of existing cooling tower use and potential future cooling tower use for a portion or all of the

facility's cooling water needs.

The present level of mitigation through inlet flow reduction through existing cooling towers should have been included in a demonstration of compliance with § 316(b), along with information and narratives addressing why further cooling tower use should or should not be implemented as part of a BTA-BPJ determination carried out under § 316(b).

Response 14:

The cooling towers and unit re-configurations of the plant upgrade project are expected to achieve water demand reductions estimated at 16.9 MGD. This will be achieved by the installation of two new re-circulating cooling towers and the removal of two once through cooling towers. A reduction in water demand within the facility will result in reduced potential harm to aquatic life at the cooling water intakes.

Comment 15:

Applicant's CWIS Documentation Contains Misleading and Erroneous References to Screens Associated with its CWIS Intakes and Water Stations and to Nominal Volumetric Flow Depictions

Applicant states in its introduction to the CWIS documentation as follows:

"Therefore, IDEM is requesting that the BP Whiting Business Unit provide a description of the CWIS that **includes the average velocity of the inflow through the intake screens**, as well as engineering drawings of the CWIS. The following sections present the CWIS configuration, water station description, and **average through screen velocity.**

Applicant then states:

"Although grating exists on the intake system to exclude large debris, **no intake screen system exists**. Next, Applicant states as to the 1911 intake:

"....**the central pipe is now an open pipe receiving vertical water flow**. **This intake provides a small proportion of the total design intake flow** and is located approximately 1,330 feet offshore.

However, the express conclusion of this statement conflicts with Applicant's own analysis on page 4 of the relative proportional flows between the 1942 and 1911 intakes. While an average 1911 intake volumetric flow of 30.3 MGD [and 33% of the total combined intake tunnel flow] can be validly described as "smaller" than the stated 1942 intake volumetric flow, as a matter of comparison, to Applicant's statement that a intake flow of 30.3 MGD means that "....this intake provides a **small proportion** of the total design intake flow is an plainly not accurate. It is merely an unsuccessful effort to minimize the impact of Applicant's continued use of a primitive

intake system having no little or no mitigation of fish and aquatic losses.

Additionally, Commenters note that Applicant states that "**Average through screen velocity** was measured on November 13, 2009 during a routine intake inspection." However, Applicant has previously explained that the facility's CWIS *do not have inlet screens at all.* at all. Applicant should therefore not have referred to the diver's intake inlet facial plane orthogonal velocity measurements as determinations of "average through-screen velocity."

Use of such terms suggests that Applicant is somehow mitigating biologically damaging conduct from intake operation with either inlet screens which do not exist, or screens within the Water Stations which cannot protect fish that have become entrained and trapped in Applicant's primitive 100% fish mortality CWIS intake systems.

Finally, Commenters note IDEM's reliance on Applicant's submitted monthly average intake volumetric data in the publication of the Fact Sheet when the agency never obtained or reviewed Applicant's calculation methodology in detail. IDEM's uncritical and non-evaluative approach to accepted Applicant's calculation model is not appropriate.

Response 15:

IDEM acknowledges that the CWIS and the intake pumps do not have screens. EPA's proposed regulation for existing facilities sets a maximum intake velocity limit of 0.5 ft/s that is based upon a hypothetical configuration of a shoreline intake with screens oriented perpendicular to the flow. EPA's regulation acknowledges that all facilities do not have this configuration and that the intake velocity is intended to be met at the opening or point of entry into the cooling water intake system. IDEM has applied its BPJ for establishing a compliance point consistent with the approach that EPA uses based upon the technology employed.

IDEM has reviewed the calculations used by BP to estimate the volumes from each of the CWIS and IDEM has concluded that they are the equivalent of an engineering estimate. However, IDEM agrees that more flow measurement data is needed to determine the flow velocity at the CWIS intake openings and the relative flow entering each of the CWIS. See Response 11.

Comment 16:

IDEM's Review of Applicant's CWIS Submittal Does Not Reflect a BAT-BPJ Determination that is Sufficient Under § 316(b)

IDEM purports to have made a determination based on BPJ that Applicant's existing cooling water intake structures represent BTA to minimize adverse environmental impact in accordance with § 316(b) as shown on p. 47-48 of the IDEM Fact Sheet. However, major portions of the IDEM's BTA determination findings and determinations

are published and taken as direct verbatim adoption of the text and analysis of Applicant's CWIS documentation. Additionally, IDEM improperly treated the application as complete notwithstanding the severe deficiencies documented in the previous section.

As discussed above, § 316(b) requires IDEM as part of the NPDES permit issuance process to use BPJ to set binding permit effluent limitations. A case by case analysis carried out in the present matter of Applicant's facility must necessarily examine relevant features of Applicant's CWIS intakes pertinent to making a professional judgment concerning the BTA decision.

The BPJ process of determining compliance with § 316(b) cannot act as a *de facto* variance process from the requirements of that section. In carrying out a BTA determination, IDEM must produce a result which would provide a similar level of protectiveness for fish and aquatic resources that would be provided in a national rulemaking on CWIS intakes. It is not sufficient for IDEM to defer or to allow the Applicant to defer required elements of minimization of aquatic biological damage until a time when a national binding rule is published. BPJ review necessarily involves scientific inquiry and assessment of what specific "adverse environmental impacts" in the form of fish and aquatic fauna mortalities are presently caused by the present design and operation of Applicant's present CWIS intake equipment in Lake Michigan.

A valid BPJ determination is not possible when no information exists and no inquiry is made to the present level of biological damage being caused by the facility's present CWIS intakes, as inquiry on "adverse environmental impacts" must necessarily focus on biological damage in the form of aquatic mortalities for fish and aquatic fauna in all life stages. Such an inquiry should provide a quantitative basis for decision-making in the form of a biological identification of the amount, the rate and the flow-relatedness of fish and aquatic fauna mortalities from operation of the two intake in Lake Michigan. A valid inquire further involves physical identification, analysis and narrative review showing each element of Applicant's present CWIS intake design and operation and a review of how and whether each of these physical and operational CWIS elements mitigates "adverse environmental impacts" in the form of biological damage caused by Applicant's CWIS intakes. A scientifically defensible BTA-BPJ review must also not merely review the impact of existing CWIS equipment, but must necessarily consider and evaluate potential use of alternative intake physical configurations and techniques having the potential to control, limit or eliminate impingement and entrainment losses, including intake flow reductions, fish return systems, alternate internal and inlet opening screen systems, use of adjacent fine mesh nets, and other intake mitigation and control techniques. As a matter of law and logic, consideration of such alternative technologies for mitigating adverse environmental impacts is part and parcel of determining whether the technology the Applicant is using is actually the "best technology available." That determination simply cannot be made if the limits its analysis to only those technologies presently in use by Applicant.

It should not have taken IDEM from the time of Applicant's first renewal

application submittal in February 2012 until April of 2012 to arrive at the conclusion that the Applicant should have addressed fish return systems in their application renewal narrative and demonstration. IDEM should have informed the Applicant back in February 2012 that its application was incomplete because it did not incorporate a fish return system. If IDEM had taken such an action in February, 2012, then at the present time the Applicant would have been getting a final approval on a specific plan to comply at an earlier rather than a later time. IDEM's failure to diligently require the implementation of 33 U.S.C. §3126(b) requirements can potentially lead to 3-5 years of additional delay before the Applicant is in final compliance with what IDEM deems to be appropriate fish protection and aquatic mortality mitigation measures.

The sections below describe in detail how IDEM failed to adhere to these requirements, and failed to conduct the analysis necessary for a scientifically defensible BTA-BPJ determination.

Response 16:

See Response 9.

Comment 17:

IDEM Failed to Adequately Assess Current Aquatic Life Impacts

Applicant's August 2012 Cooling Water Intake Document contained no information at all addressing impingement and entrainment mortalities of fish and aquatic fauna from the present design and operation of Applicant's two Lake Michigan CWIS intakes. IDEM Office of Water Quality ("OWQ") has also not collected information quantifying biological damages and aquatic mortalities from Applicant's two Lake Michigan CWIS intakes. Accordingly, the OWQ inappropriately determined that Applicant's NPDES renewal submittal was complete IDEM staff have confirmed that Applicant has never been asked to document and quantify its present level of biological damages in the context of the duty to "minimizing adverse environmental impacts" during the past history of IDEM regulation of the facility.

Given that no information at all exists in the record about fish and aquatic fauna mortalities in all life stages caused by the existing design and operation of Applicant's CWIS intakes, IDEM's BTA-BPJ finding and determination that Applicant's CWIS intakes "minimize adverse environmental impacts" is plainly insufficient. IDEM's determination must be set aside because its finding that Applicant is minimizing "adverse environmental impacts" is not supported by scientific evidence of present and existing biological damages from Applicant's intake equipment.

Response 17:

See Response 9